

# **DES Fleet & Parking Services: Long Range Electric Vehicle (EV) Training**



Washington State Department of  
**Enterprise Services**

# *Vehicle User Training - Agenda*

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- Introduction
- Overview and history of DES Fleet & Parking Services
- Why Electric Vehicles
- About Electric Vehicles
- Charging times
- Long Range Electric Vehicles
- Route planning
- Q&A's



# ***Fleet & Parking Services***

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## ***A focus on sustainability, efficient management***

- Enterprise Services manages fleet operations of more than 4,400 sedans, sport-utility vehicles, light trucks and vans.
- 37 staff members oversee the professional fleet management, service & repairs, and disposal of state owned vehicles
- Enterprise Services Fleet Operations provides vehicles for assigned agency use, three daily rental sites, and offers maintenance for vehicles in Thurston County.
- Fully battery electric and hybrid vehicles account for more than half our fleet



# Why Electric Vehicles?



Low cost fuel source



Zero Emissions and reduced carbon footprint



Lower maintenance costs

Easy to drive and park



Quiet Operation



# Governor's *Electric Fleet Initiative*

JAY INSLEE  
Governor



STATE OF WASHINGTON  
OFFICE OF THE GOVERNOR

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## Washington State Electric Fleets Initiative

"I am announcing a new initiative to accelerate adoption of electric vehicles in public and private fleets. This "Washington State Electric Fleets Initiative" will ensure that at least 20% of all new state passenger vehicle purchases are electric vehicles by 2017. I am taking this action today to help fleets scale up their use of EVs, and to 'double-down' on the 10% EV fleet target established by the Pacific Coast Collaborative.

"We won't defeat climate change unless we use all of the tools we have available—and that includes what we buy in the market place for our daily use. All institutions need to focus their procurement policies and practices on low-carbon options, as these investments will save money, protect public health, and secure our long-term future."

--Governor Jay Inslee

This "Washington State Electric Fleets Initiative" will ensure that at least 20% of all new state passenger vehicle purchases are electric vehicles by 2017.



# *How EVs save the state money*

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## Cost Savings

- Lower maintenance
  - No oil changes
  - Fewer parts
- Saving time
  - No need to refuel on trips under 200 miles
- Cheaper fuel
  - In WA, 1 Kwh costs approx. \$0.10

## Cost avoidance

- Lower healthcare costs
  - Asthma
- Lower pollution costs
  - Oil spills
  - Carbon emissions
- Lower climate costs
  - Fires, drought, flooding
- Lower remediation costs
  - Puget Sound clean-up



# *Chevy Bolt*





# Bolt User Guide

Getting to Know Your 2017



Please do not  
remove from vehicle

## Getting Started

### POWER Button

The Bolt EV features an electronic push-button start. The **POWER** button flashes when the driver's door is opened upon entry. Once the vehicle is ON, the button illuminates.

**Note:** The air conditioning compressor, pumps and fan may run at any time — even when the vehicle is OFF — to cool or warm the propulsion battery.

### Starting the Vehicle/ON

- ▶ With the vehicle in Park or Neutral, press the brake pedal and then press the **POWER** button. A power ON audio cue will sound.

The vehicle will not shift out of Park and a Charge Cord Connected message will display if the vehicle is still plugged in. When ON, the instrument cluster will display an active battery.



### Stopping the Vehicle/OFF

- ▶ Shift to Park and then press the **POWER** button. A power OFF audio cue will sound.

### Pedestrian Safety Signal

The vehicle is equipped with an automatic sound generator. The sound is automatically generated at speeds below 14 mph to indicate the vehicle's presence to pedestrians.

## Electronic Precision Shift

The electronic drive unit shift lever always starts in a center position, represented by a dot on the shift pattern displayed on top of the shift lever. The selected gear position illuminates in red. After shifting, the shift lever returns to the center position.

**Park** – Press the button on top of the lever (A) to shift into Park. The vehicle will not shift out of Park unless the ignition is on, the brake pedal is applied, and the button on the side of the lever (B) is pressed.

**Reverse** – Press the button on the side of the lever (B) and move the lever forward and then left to shift into Reverse.

**Neutral** – Move and hold the lever forward for 1/2 second to shift into Neutral.

**Note:** The transmission will not stay in Neutral for an extended period. It will automatically shift into Park.

**Drive** – Move the lever rearward to shift into Drive.

**One-Pedal Driving** – With the transmission in Drive, pull the lever rearward to the L (Low) position to enable "one-pedal" driving. When the accelerator pedal is not applied, regenerative braking is active to help slow the vehicle. Use the brake pedal for additional braking or panic stops. Pull the lever rearward again to return to Drive.



### Automated Car Wash Mode

To place the transmission in Neutral with the vehicle running:

1. While pressing the brake pedal, open the driver's door and then shift to Neutral.
2. The indicator should show N. If it does not, select Neutral again.
3. Upon returning to the vehicle, shift into Park.

### Electric Parking Brake

- ▶ To apply the parking brake, pull up the **P** Parking Brake switch by the shift lever.
- ▶ To release the parking brake, turn on the vehicle, press the brake pedal, and then press the **P** switch.



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## Efficiency

### Electric Range

Electric range is affected by colder outside temperatures. During colder months, the energy needed to warm the vehicle's cabin and propulsion battery can cause the vehicle's electric range to decline. See Driving for Better Energy Efficiency in the Driving and Operating section in your Owner Manual.

### Driving Style

Your driving style plays a large role in the efficiency of the vehicle. Avoid rapid acceleration or deceleration to help maximize energy efficiency and range. Electric range is maximized at 50 mph and below; higher speeds use more energy and significantly reduce electric range.

### Efficiency Gauges

- ▶ Use the 5-way control to select an instrument cluster layout that displays the green efficiency bar, ball or ring indicator.

While driving, try to keep the bar or ring green, or the ball in the center of the gauge, depending on the cluster theme selected. The bar or ring will turn yellow or the ball will move up or down during inefficient acceleration or aggressive braking.



### Regen on Demand™

Regen on Demand temporarily regenerates energy from the vehicle's momentum and stores it in the high voltage propulsion battery for later use.

- ▶ To activate Regen on Demand, pull and hold the left paddle on the back of the steering wheel without pressing the brake pedal or accelerator pedal.

While pulling the paddle, the vehicle will begin to decelerate using regenerative braking. Regen on Demand is deactivated once the paddle is released or the accelerator pedal is pressed.



## Charging

### Battery

The Bolt EV is powered by a lithium-ion high voltage battery pack, which holds its charge efficiently and has no memory effect (so it doesn't have to be run down completely before recharging). Keep the vehicle plugged in, even when fully charged, to keep the battery temperature ready for the next drive.

### Charging Time

Charging rates and times vary depending on outside temperature and remaining charge.

- ▶ When using a 120-volt electrical outlet, it will charge at a rate of 4 EV miles per hour with the 12-amp setting (approximately 50 hours total to charge the vehicle).
- ▶ When using a 240-volt charging station, it will charge at a rate of 12 EV miles per hour at a 16-amp level (approximately 19 hours total), and at a rate of 25 EV miles per hour at a 32-amp level (approximately 9 1/2 hours total to charge the vehicle).
- ▶ Using a public DC Fast Charging station with the available Fast Charge port, it will charge to achieve 90 EV miles in 30 minutes at an 80kW power level from a depleted battery.

### Programmable Charging

There are 3 programmable charging modes: Immediately upon plug-in; delayed based on Departure time; and delayed based on Electric Rate and Departure Time.

- ▶ Touch the **Energy** icon on the touchscreen and then touch the Charging icon to view the current Charge Mode and Charge Limit.
- ▶ Touch the Charge Limit toggle button to select a different charge level.
- ▶ Touch the desired Charge Mode box to select a different charge mode.

### Charging Status

The Charging Status indicators are located on the instrument panel near the windshield and on the illuminated charge port (if available).

**Single tone and flashing indicator** – Vehicle is plugged in; battery is charging. Flashes indicate current percentage of battery charge.

- 1 flash: 0–25% charged
- 2 flashes: 25–50% charged
- 3 flashes: 50–75% charged
- 4 flashes: 75–99% charged
- Solid light: 100% charged

**Slow (long pulse) flashing green indicator with double tone** – Vehicle is plugged in; battery charging is delayed.

**Solid green indicator** – Vehicle is plugged in; battery is fully charged

**Solid yellow indicator** – Vehicle is plugged in; not charging

**No light** – Vehicle is not plugged in OR there is an issue with the charger or outlet

**No light and repetitive tones** – Issue with the charge cord connection



**Push on right  
side of filler  
door to open.**

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For assistance Mon-Fri 6:30 – 5:30 call DES at 360-664-9215 or call 888-811-1926 for Chevrolet Roadside Assistance After-hours





# Terminology & Vehicle Types



BEV = Battery Electric Vehicle



PHEV = Plug-in Hybrid Electric Vehicle



HEV = Hybrid Electric Vehicle

## EVSE = Electric Vehicle Supply Equipment

Level 1 = 120 volt “household outlet”

Level 2 = 240 volt

DC Fast Charger = 480 volt / 3 phase



ICE = Internal Combustion Engine



# Charge Times

## EVSE Charging Rates and Times

Type	Output Factors	Power	Charge Rate <sup>1</sup>		Charge Time <sup>2</sup>	
			LEAF <sup>3</sup>	Bolt <sup>4</sup>	LEAF <sup>3</sup>	Bolt <sup>4</sup>
LV II	208/240VAC @ 16A	3.84kW	14.67 mc/h	13.31 mc/h	7.29 hrs	15.63 hrs
LV II	208/240VAC @ 30A	7.2kW	25.22 mc/h	24.96 mc/h	4.24 hrs	8.33 hrs
DCFC	400VDC @ 62.5A	25kW	95.54 mc/h	86.67 mc/h	1.12 hrs	2.4 hrs
DCFC	400VDC @ 120A	50kW	191.07 mc/h	173.33 mc/h	0.56 hrs	1.2 hrs

<sup>1</sup> Charge Rate is measured in miles of charge per hour (mc/h) and based on EPA estimated ranges.

<sup>2</sup> Times based on an empty battery.

<sup>3</sup> Nissan LEAF with 30kWh battery and EPA estimated 107 miles of range.

<sup>4</sup> Chevrolet Bolt with 60kWh battery and EPA estimated 208 miles of range.

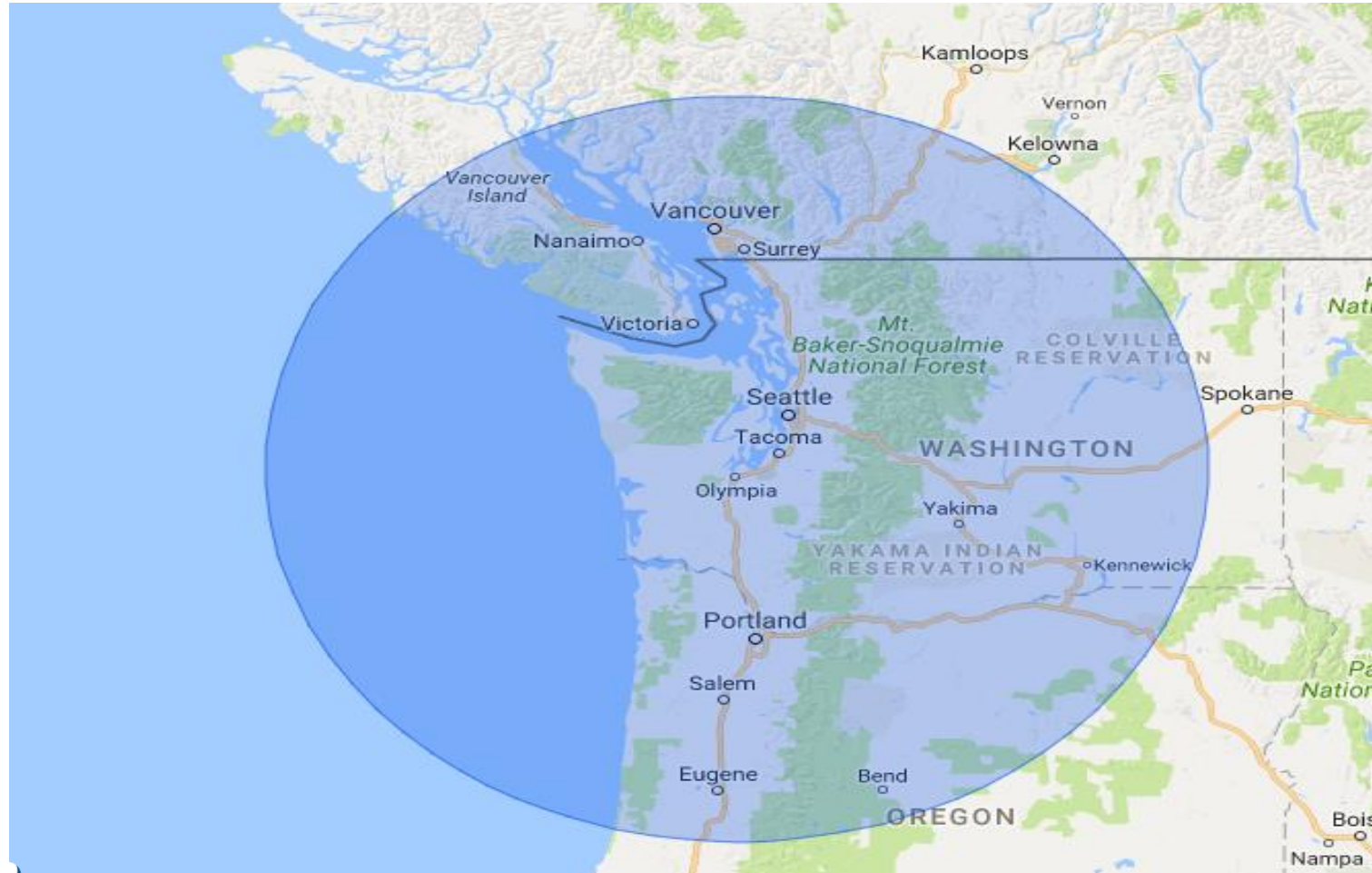
<sup>5</sup> LV 1 24-48 hours

Source: GreenLots

The Bolt can travel 238 miles on a single charge!!

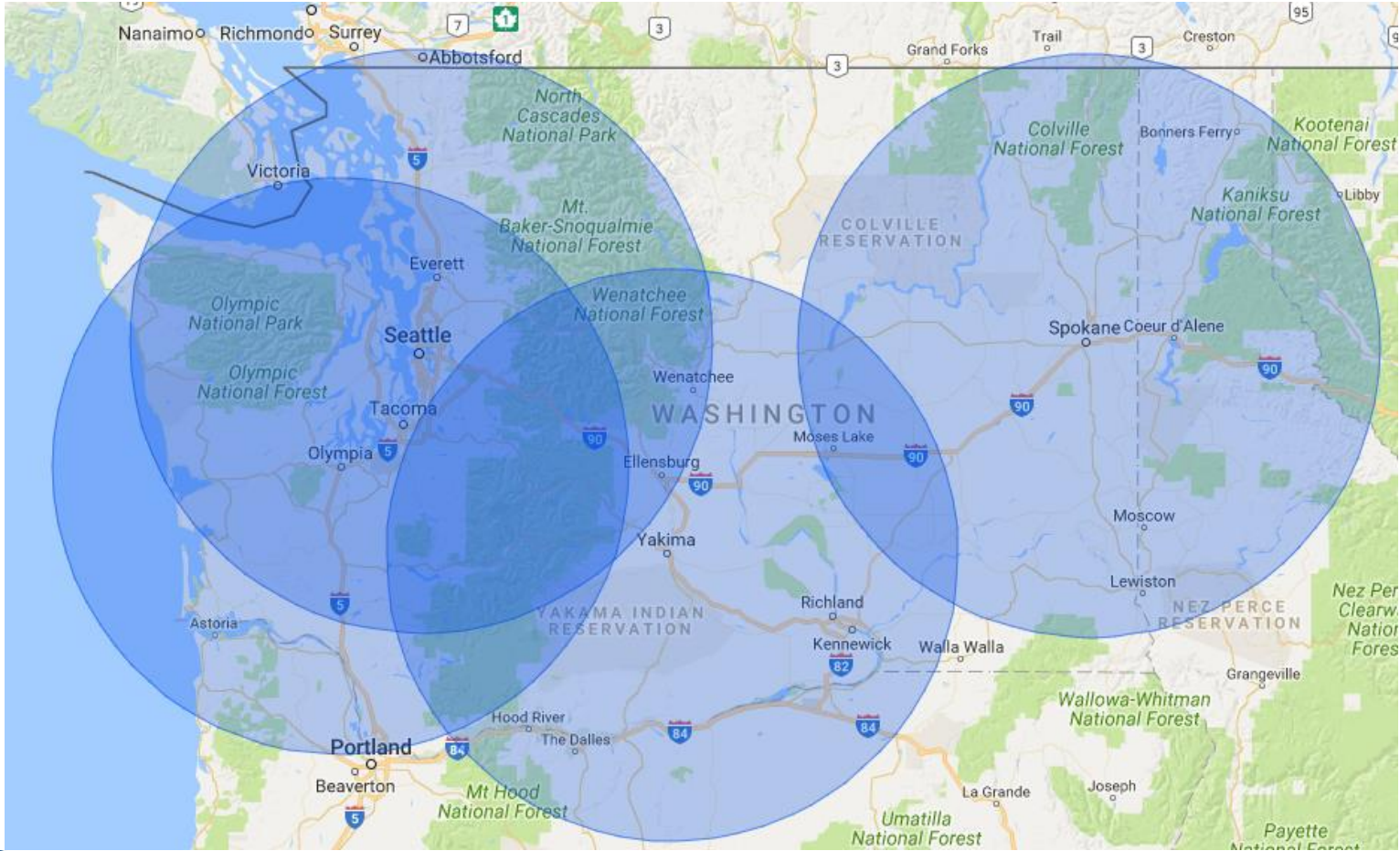


# *How far does 238 miles get you?*





## 100-mile radius distance map

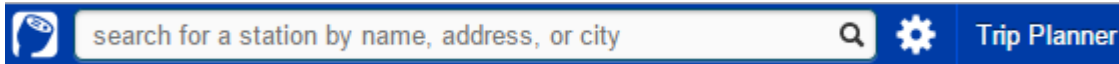


*Olympia, Seattle, Yakima, and Spokane*

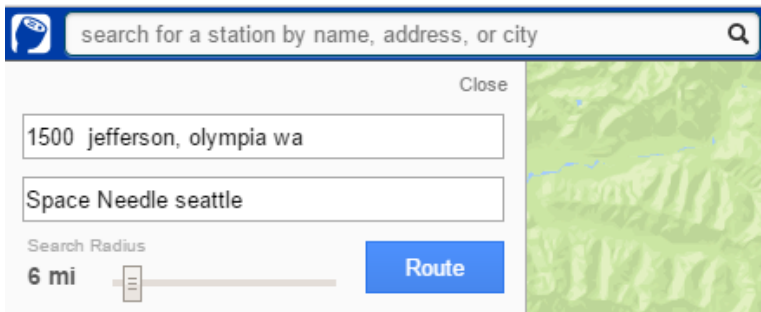


# Using plugshare.com trip planner

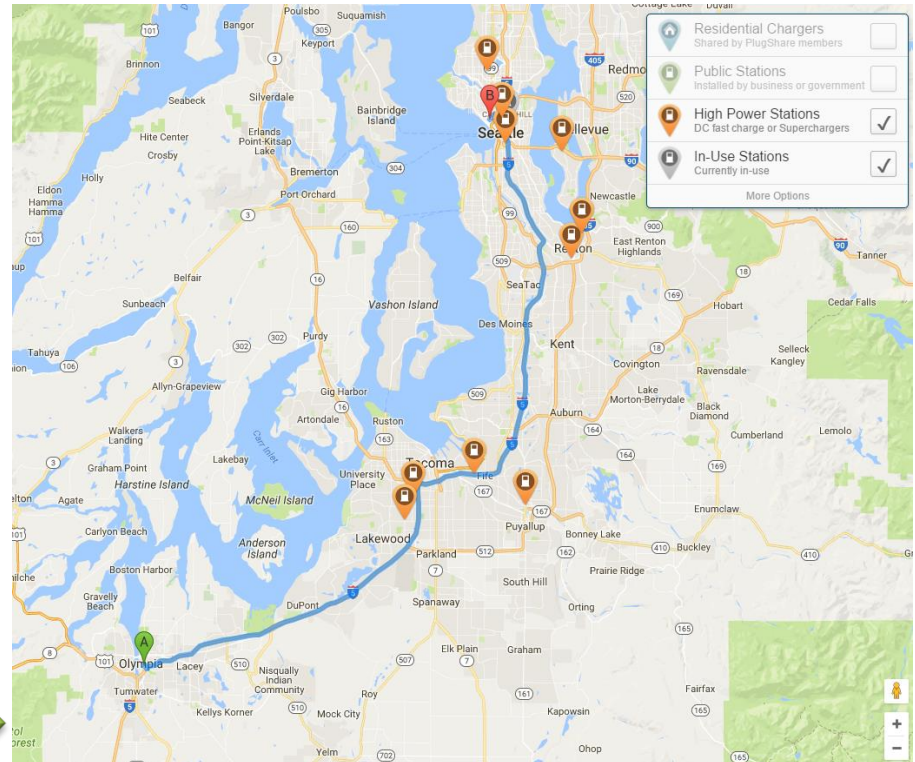
Step 1: Click Trip Planner tab



Step 2: Enter starting location and destination



Step 3: Located charging stations along route



# Charge Card



**Nissan Leaf**



**Chevy Bolt**





# Levels of Charging

## AC Level 1 Charging

2 to 5 miles of range per  
1 hour of charging



J1772 charge port

AC Level 1 EVSE (often referred to simply as Level 1) provides charging through a 120 volt (V) AC plug. Most, if not all, plug-in electric vehicles (PEVs) will come with an AC Level 1 EVSE cordset, so no additional charging equipment is required. On one end of the cord is a standard [NEMA](#) connector, (for example, a NEMA 5-15, which is a common three-prong household plug) and on the other end is an SAE J1772 standard connector. The SAE J1772 connector plugs into the car's J1772 charge port and the NEMA connector plugs into a standard [NEMA](#) wall outlet.

AC Level 1 is typically used for charging when there is only a 120V outlet available, but can easily provide charging for all of a driver's needs. For example, 8 hours of charging at 120V can replenish about 40 miles of electric range for a mid-size PEV.



## AC Level 2 Charging

10 to 20 miles of range per  
1 hour of charging



J1772 charge port

AC Level 2 equipment (often referred to simply as Level 2) offers charging through 240V (typical in residential applications) or 208V (typical in commercial applications) electrical service. Most homes have 240V service available, and because AC Level 2 EVSE can charge a typical EV battery overnight, they will commonly be installed at EV owners' homes for [home charging](#) or are used for [public charging](#) equipment. This charging option can operate at up to 80 amperes and 19.2 kW. However, most residential AC Level 2 EVSE will operate at lower power. Many of these units operate at up to 30 amperes, delivering 7.2 kW of power. These units require a dedicated 40 amp circuit.

AC Level 2 equipment uses the same SAE J1772 connector and charge port that Level 1 equipment uses. All commercially available PEVs have the ability to charge using AC Level 1 and AC Level 2 charging equipment. Although Tesla vehicles do not have a J1772 charge port, they do sell an adapter.

## DC Fast Charging

50 to 70 miles of range per  
20 minutes of charging



J1772  
combo



CHAdeMO



Tesla  
combo

Direct-current (DC) fast charging equipment, sometimes called DC Level 2 (typically 208/480V AC three-phase input), enables rapid charging along heavy traffic corridors at installed stations. There are three types of DC fast charging systems, depending on the type of charge port on the vehicle: a J1772 combo, CHAdeMO, or Tesla.

The **J1772 combo** is used by Chevrolet and BMW and is unique because a driver can use the same charge port when charging with Level 1, 2, or DC Fast equipment. The only difference is that the DC Fast Charge connector has two bottom pins.

The **CHAdeMO** is the most common of the three connector types and is used by Nissan, Mitsubishi, and Toyota.

**Tesla** vehicles have a unique charge port and connector that works for all their charging options including their fast charging option, called a supercharger.

Source: [AFDC](#)



# Charging Stations

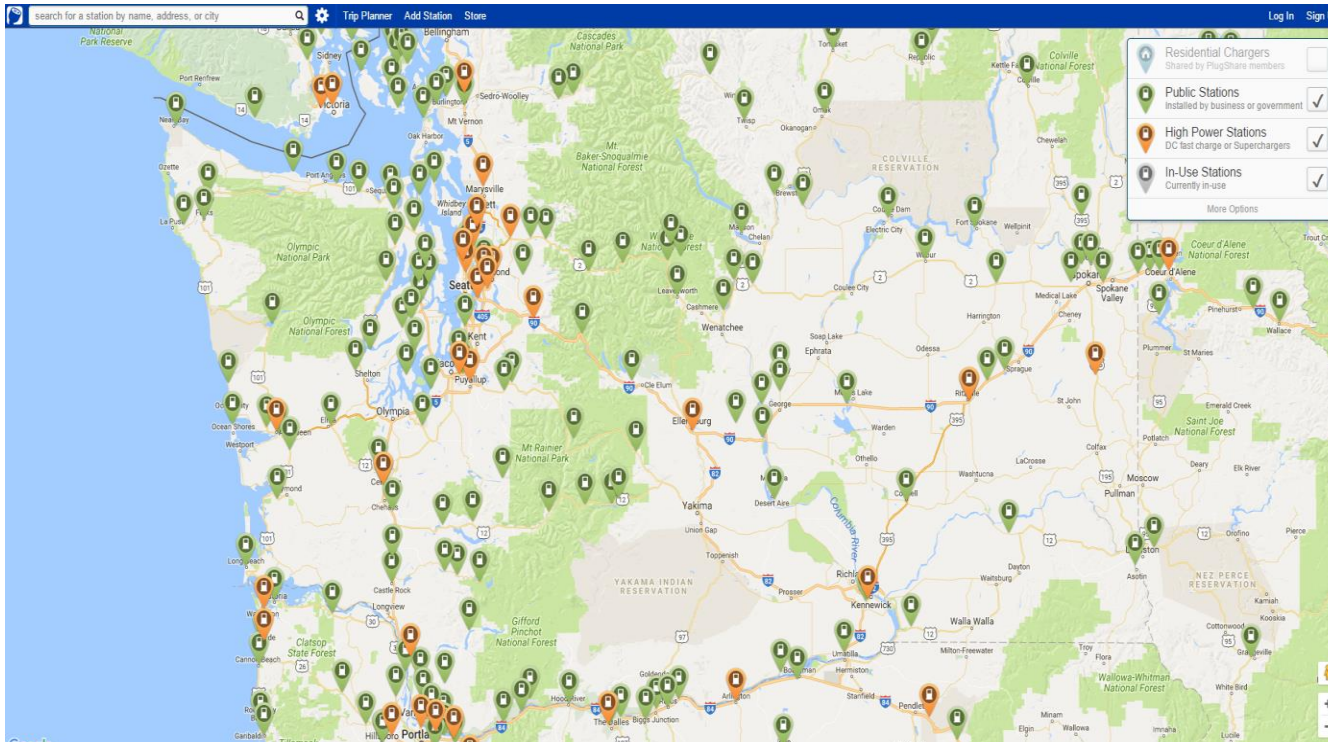
DC Fast Charger



Level 2



# Charging Stations



## Washington's DC Fast Charging Stations





# *Route Planning*

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- Length of your trip
- Weather conditions
- Highway vs in town travel
- Are charging stations available at your destination?

## Charging station locators

- Plugshare [www.plugshare.com](http://www.plugshare.com)
- AFDC [www.afdc.energy.gov](http://www.afdc.energy.gov)



# *Thank You!!*

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## *Questions?*

*A vehicle demonstration will be immediately after in-person presentations. To schedule a demonstration, please call 360-664-9210*

*For more information, please visit our DES Electric vehicle [website](#) or;*

*Contact George Carter II, DES Fleet & Parking Services Manager (360) 664-9213 or [george.carter@des.wa.gov](mailto:george.carter@des.wa.gov)*

